

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior listings.

1. (PREVIOUSLY PRESENTED) A pulse detonation wave engine detonation system comprising:

a plurality of detonation banks, each detonation bank having a plurality of detonation chambers for receiving a fuel/oxidizer mixture from a fuel/oxidizer source;

an optical ignition subsystem independent of, and positioned apart from, the detonation banks for generating a plurality of optical pulses, the optical pulses igniting each fuel/oxidizer mixture such that the chambers detonate in a desired order; and

an optical transport subsystem for transporting the optical pulses from the optical ignition subsystem to the chambers in a repeated fashion.

2. (ORIGINAL) The detonation system of claim 1 wherein the optical ignition subsystem includes:

an optical energy source for generating optical energy at a predetermined intensity level;

an optical multiplexing device for separating the optical energy such that the optical energy sequentially detonates the banks and simultaneously detonates the chambers within each bank; and

an optical interface for optically coupling the energy source to the multiplexing device.

3. (ORIGINAL) The detonation system of claim 2 wherein the energy source generates a single pulse of the optical energy, the multiplexing device dividing the single pulse into a plurality of pulses and routing the pulses to the chambers.

4. (WITHDRAWN) The detonation system of claim 2 wherein the energy source generates a plurality of pulses of the optical energy, the multiplexing device routing the pulses to the chambers.

5. (ORIGINAL) The detonation system of claim 2 wherein the energy source is a laser.
6. (ORIGINAL) The detonation system of claim 1 wherein the optical transport subsystem includes a plurality of optical fibers.
7. (ORIGINAL) The detonation system of claim 1 wherein the optical energy drives each fuel/oxidizer mixture into a self-initiating chemical admixture.
8. (ORIGINAL) The detonation system of claim 1 wherein the optical pulses are generated in accordance with a predetermined optical intensity equation.
9. (PREVIOUSLY PRESENTED) The detonation system of claim 8 wherein the optical intensity equation is defined by a formula comprising:

$$I_{cr} = \left\{ \left[ mcE_i \left( 1 + (\omega\tau)^2 \right) \right] / \left[ 2\pi e^2 \tau \right] \right\} \left[ g + 1 / \tau_p \log_e (p_{cr} / p_o) \right]$$

where  $p_{cr}$  is the critical electron number for breakdown,  $\tau_p$  is the laser pulsewidth,  $m$ ,  $E$ ,  $c$  are the electron constants,  $\omega$  is the optical field frequency,  $E_i$  is the ionization energy of the fuel/oxidizer or oxidizer,  $\tau$  is the momentum transfer collision time,  $g$  is the electron loss rate, and  $p_o$  is the "initial" electron density.

10. (PREVIOUSLY PRESENTED) An optical ignition subsystem for a pulse detonation wave engine detonation system, the ignition subsystem including:
  - an optical energy source for generating optical energy at a predetermined intensity level;
  - an optical multiplexing apparatus for multiplexing the optical energy such that the optical energy sequentially detonates banks of the detonation system and simultaneously detonates chambers contained within each bank, where the detonation banks are positioned independently of and apart from the optical ignition subsystem;

an optical interface for optically coupling the energy source to the multiplexing apparatus;  
and

an optical transport subsystem for transporting the optical energy from the optical multiplexing apparatus to the chambers in a repeated fashion.

11. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 10 wherein the energy source generates a single pulse of the optical energy, the multiplexing apparatus dividing the single pulse into a plurality of pulses and routing the pulses through the optical transport subsystem to the chambers.

12. (WITHDRAWN) The detonation system of claim 10 wherein the energy source generates a plurality of pulses of the optical energy, the multiplexing apparatus routing the pulses to the chambers.

13. (CANCELLED)

14. (PREVIOUSLY PRESENTED) A method for detonating a pulse detonation wave engine, the method comprising the steps of:

transporting a fuel/oxidizer mixture from a propellant source to a plurality of detonation banks, each detonation bank having a plurality of detonation chambers;

generating a plurality of optical pulses, the optical pulses igniting each fuel/oxidizer mixture such that the chambers detonate in a desired order; and

transporting the optical pulses to the chambers in a repeated fashion, where the optical pulses are generated by an optical ignition subsystem positioned independently of, and apart from, the chambers.

15. (ORIGINAL) The method of claim 14 further including the steps of:

generating optical energy at a predetermined intensity level; and

separating the optical energy such that the optical energy sequentially detonates the banks and simultaneously detonates the chambers within each bank.

16. (ORIGINAL) The method of claim 15 further including the steps of:

generating a single pulse of the optical energy; and

dividing the single pulse into a plurality of pulses.

17. (WITHDRAWN) The method of claim 15 further including the step of generating a plurality of pulses of the optical energy.

18. (ORIGINAL) The method of claim 14 further including the step of driving each fuel/oxidizer mixture into a self-initiating chemical admixture.

19. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 10 wherein the energy source is a laser.

20. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 10 wherein the optical energy detonates the chambers by igniting a fuel/oxidizer mixture from a fuel/oxidizer source such that the chambers detonate in a desired order.

21. (CANCELLED)

22. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 10 wherein the optical transport subsystem includes a plurality of optical fibers.

23. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 20 wherein the optical energy drives each fuel/oxidizer mixture into a self-initiating chemical admixture.

24. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 10 wherein the optical energy is generated in accordance with a predetermined optical intensity equation.

25. (PREVIOUSLY PRESENTED) The ignition subsystem of claim 24 wherein the optical intensity equation is defined by the formula comprising:

$$I_{cr} = \left\{ \left[ mcE_I \left( 1 + (\omega\tau)^2 \right) \right] / \left[ 2\pi e^2 \tau \right] \right\} \left[ g + 1/\tau_p \log_e (p_{cr} / p_o) \right]$$

where  $p_{cr}$  is the critical electron number for breakdown,  $\tau_p$  is the laser pulsewidth,  $m$ ,  $E$ ,  $c$  are the electron constants,  $\omega$  is the optical field frequency,  $E_I$  is the ionization energy of the fuel/oxidizer or oxidizer,  $\tau$  is the momentum transfer collision time,  $g$  is the electron loss rate, and  $p_o$  is the "initial" electron density.

26. (NEW) The detonation system of claim 1 wherein the optical multiplexing device separates the optical energy such that the optical energy sequentially detonates the banks and simultaneously detonates the chambers within each bank.

27. (NEW) The ignition subsystem of claim 10 wherein the optical multiplexing apparatus separates the optical energy such that the optical energy sequentially detonates banks of the detonation system and simultaneously detonates chambers contained within each bank.